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DEPRECIATION PROBLEMS

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DEPRECIATION PROBLEMS

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Member of Wisconsin Railroad Commission, before National Gas Institute, N. Y., Oct. 22nd, 1914.

This paper deals mostly with the financing and the accountancy of depreciation and with certain questions that are involved in distinguishing between depreciation and ordinary repairs. Such phases of depreciation as its nature, the necessity of providing for it, the method of determining the life of the property have been touched upon but not discussed at length.

Of all the subjects that have been brought to light and discussed, especially in connection with the regulation of public utilities, none has presented a more fruitful field for differences of opinion than is the case for depreciation. The discussions that have been carried on upon this subject and the facts that have been brought out concerning it, however, have led to a fairly general settlement of some of its fundamental features. For instance, depreciation is now quite generally said to represent that loss of value and efficiency in property and equipment which is due to wear and tear, to age or general decay, and to inadequacy and obsolescence. It is also generally acknowledged that these losses are proper charges to the operating expenses and should be covered by the earnings and that they should be considered in connection with the valuation of the property.

In providing for depreciation the general practice is to cover that part of it which is represented by wear and tear by direct charges to the repair accounts. While such depreciation as is due to age or general decay, inadequacy and obsolescence is sometimes provided for in advance by reservations from earnings, and at other times again by charging the cost of renewing or replacing discarded units of property directly to the operating expenses.

There is still considerable dispute as to how depreciation should be measured or determined. Some depend on life tables of such property as that involved; others again upon their own judgment in the matter, based on the inspection of the property and the operating and other local conditions. While these methods will not be discussed at length here, it may be said that both are important. Life tables, properly kept, classified and used, throw a great deal of light upon the question. This may also be said of personal inspections of the property and the conditions by which its life is affected. Especially is this true when the inspections are made by competent parties. The best and most satisfactory way, however, is to use both methods. The use of life tables should be supplemented by actual inspection and vice versa. In addition to this, liberal use should also be made of all other facts that have any bearing upon the question. In this way it is usually possible to determine with a fair degree of accuracy the probable life of each class of property. That the life of the property should be determined as accurately as possible, is also of the greatest importance, for upon it are fixed the amounts that are allowed for depreciation.

The rate of depreciation thus depends upon the life of the property and is therefore higher for property with a short life than for property with a longer service life. The life of the property depends upon its nature, the character of the use that is made of it, whether it is kept up by ordinary repairs, and many other conditions. Repairs not only prolong the life of property but they maintain its efficiency for operating purposes. Charges for depreciation, when based on the life of property kept up by such repairs, are therefore not likely to be large enough to cover the cost of depreciation when repairs are included therein. Under this method of financing depreciation, therefore, it is necessary to make separate provisions with which to meet the cost of necessary repairs.

The fact that depreciation as well as ordinary repairs are proper charges to the operating expenses has not always been generally recognized. Not infrequently have renewals of all kinds been charged to the construction accounts and paid for by the proceeds from the sales of additional security issues. The fallacies involved in this, however, which become apparent when such practices are viewed in the light of settled economic theories, are gradually becoming more generally recognized. Only in exceptional cases, such as the destruction of property due to unforeseen and undeserved calamities or causes, and under highly abnormal conditions in certain other respects might it be justifiable to temporarily charge renewals or replacements to capital.

While depreciation is constantly going on, the outlays for renewals are irregular and often relatively large. These outlays are in fact of such nature that for most plants they cannot be evenly distributed from year to year. In order to prevent serious fluctuations in the operating expenses and in the net earnings it is therefore best to provide for depreciation in advance through regular annual charges against earnings, which charges are adjusted as closely as possible to the rate at which depreciation is accrued. Larger plants, such as railways, are often in position to so adjust their renewals that the cost of the same remain fairly constant from year to year. In such cases it may not be necessary to provide for depreciation in advance, since the cost of the renewals can then be charged directly to the operating expenses. Under this practice, however, there is often a great deal of accrued depreciation that is not offset by assets in some form. Without reserves of some sort, the investment cannot be kept intact.

Several methods are proposed for financing the accrued depreciation. The most important of these, and the ones which seem to be best adapted to public service properties operating under regulation, are the straight line and the sinking fund methods. These have been explained and their use illustrated.

It will thus be assumed in this discussion that depreciation is to be set aside on either the "straight line" or "sinking fund" basis. According to the straight line method the annual allowance for depreciation is arrived at by dividing the cost new less scrap value of the depreciable property of each group by the estimated life of that group. The sum total of the allowances for all groups will give the total annual amount necessary. The rate of depreciation, according to this method, is therefore obtained by dividing this total annual allowance necessary to cover the depreciable property for the plant as a whole by the cost new less scrap value of all the depreciable property of the plant. Under the sinking fund method it is assumed that the amounts allowed for depreciation are invested at compound interest at a given rate, and that this interest also goes to make up the annual provision for depreciation. Since, in this case, the element of interest as well as the principal becomes part of the annual provision for depreciation, it necessarily follows that the annual charges to operating expenses need not be as large as would be the case if no interest allowances were included. The annual allowance necessary for each group of property is derived by multiplying the cost new less scrap of each group by a rate per cent gotten from sinking fund tables. The sum total of the allowances for all groups will give the total annual amount necessary exclusive of interest. By dividing the total annual allowance by the cost new less scrap of all the depreciable property the rate per cent will be obtained.

The procedure under either method is approximately the same. Only from an accounting viewpoint is there any distinction worth noting: under the straight line method the annual allowance for depreciation is obtained from only one source, or from charges to the operating expenses alone; under the sinking fund method the annual allowance is obtained from two sources, or partly from charges to the operating expenses and partly from the interest received for the use of depreciation balances.

Arguments to the effect that under the sinking fund method, in order that interest may be had for the use of the balances for depreciation, it is necessary to segregate the amounts set aside for depreciation into a reserve fund, do not seem to be supported by the facts. For instance, there does not seem to be any good reasons why assets offsetting the depreciation reserve can not be as effectively employed for interest earning purposes as balances in the depreciation reserve fund. All that is necessary to that end in either case is that such assets and balances are in such form as to be available for use, and that opportunities are offered for their profitable employment. The confusion upon this point is probably due to failure to note the differences that exist between the sinking fund method of providing for depreciation and sinking fund requirements for the retirement of bonds.

It is an open question from a business point of view whether it is advisable to establish a depreciation reserve fund at all. In order to establish such a fund it is necessary to transfer to it the cash or other assets that are held against the depreciation reserve. Further, in order that interest may be earned on the assets so transferred it is necessary that the balance in the fund be placed at interest or temporarily invested in such a way that it will be readily available when needed for renewals. As the depreciation assets or balances can be as well, if not better, used or invested while standing as offsets to the depreciation reserve as after they have been transferred into the reserve fund, the creation of a reserve fund will only place a few additional restrictions upon the use of these balances. It will probably result in this: that the amounts set aside for depreciation will in part find their way into the reserve fund and in part be held as offsets to the reserve account. Whether the provisions for depreciation are placed in the reserve fund or merely treated as offsets to the reserve account would not seem to be of vital importance. This is at any rate the case when the affairs of the plant are properly managed.

The amounts thus set aside for depreciation, however, while held awaiting the use for renewals, should be advantageously employed. For such employment the opportunities are often numerous, but none would seem to be more advantageous and economical from a business point of view than those which are offered by such extensions to the plant as are needed from time to time, often annually. Such employment of the reserve assets enables extensions to be made even under adverse financial conditions when capital might not be obtainable in any other way. It is also as a rule fairly well secured against extraordinary risks, and besides is likely to bring better returns than could be obtained elsewhere. It must be understood, however, that such use of these assets in the plant should not be considered permanent investment, but rather in the nature of a loan, and that whenever needed for renewals the loans so made must be returned to the reserve or fund. The use of assets offsetting the reserve for plant extensions therefore merely *postpones* the time when additional capital securities must be issued for the cost of these extensions. Security issues for such purposes and under such conditions are in fact capital issues, and should be so regarded. As such loans thus tend to defer, sometimes for years, the issuing of capital securities for new extensions, they also defer the interests payment thereon and hence often result in considerable savings to the plant from this source.

It would even seem that for a permanent plant, owing to the fact that its cost new less depreciation will always remain much less than its cost new, a part of the amount set aside to keep the investment intact might be permanently withdrawn and returned to the investors. Such return of a part of the investment, however, would amount to about the same thing as the withdrawal of an equal proportion of the capital invested, and would therefore reduce the basis upon which the returns for interest and profits should be allowed. It would also alter the basis upon which the depreciation allowances are computed, especially under the sinking fund method. While such withdrawal of a part of the capital might be practical, it is so closely connected with other conditions that it is doubtful whether in the end it would be in line with the best policy.

The assets offsetting the depreciation reserve may also at times be profitably used as additional working capital and for other more or less temporary purposes in the operation of the plant. When such assets are in such form as to permit it, there are also times when for most plants it is not only more convenient, but less costly to borrow for current use from these assets than from the banks. Instances in point might easily be mentiond were this thought necessary.

It is of course necessary for utility managers to use discretion in determining how much of the depreciation reserve should be represented by plant, and how much by other assets of various kinds. Care should be taken that the policy adopted in this respect is not one that will injure the service. The amounts for depreciation are contributed by the consumers through the rates they pay for the service, and the consumers as such are entitled first of all to reasonably adequate service. Any use of the moneys for purposes through which the service is impaired is in direct violation of the principles which justify an allowance for depreciation, and should be avoided. Whether the amounts set aside for depreciation should be placed in a reserve fund or merely kept as offsets to the reserve account would seem to be questions that largely depend upon the character of the management and the circumstances under which the plant is operating. For some plants the former course may be the best; for other plants, again, the latter. There are also likely to be plants whose interests are best protected when a part of these assets are placed in the reserve fund and a part employed for current purposes.

Since under the sinking fund method of providing for depreciation it is necessary that the balance held for such depreciation until needed for renewals be so used or invested as to bring in something in the way of interest, the question arises as to the basis upon which such interest should be figured. In thus determining upon how interest is to be figured there is much to be taken into consideration. In the first place, it cannot often be safely assumed that the entire balance can always be so used as to earn interest. If any part of it remains idle from time to time, as it is almost certain to do at least for shorter periods, the interest is reduced by that much. Then again, the question of the safety of the loan or investment must be taken into account. Balances of this kind should not be placed in risky undertakings, even if this means lower returns for interest. Small risks and low rates of interest usually go together. The rates of interest paid on deposits by banks and trust companies do not exceed 3 or 4 per cent, depending upon the time involved. First class bonds and mortgages readily convertible into cash yield but little more than this. Depreciation balances, because of the circumstances involved, are likely to yield even lower rates than those given. In view of these and other facts it is not safe to assume that such balances will regularly bring more than from 2 to 4 per cent on their entire amount.

The interest thus received from the balances held for depreciation should be as carefully accounted for as any other part of the business. In the income account, for instance, such interest accretions may be shown both as non-operating revenues and as deductions from gross income. When presented in this form they can be fully taken into the accounts without affecting the net earnings from operation alone.

Since depreciation is an operating expense, it should also be charged to operating expenses, and such charges to these expenses should be made in monthly or other periodical allowances. When regularly charged up in this way there is also likely to be a fairly close agreement between the sum of these charges and the amount of the depreciation that has taken place in the property.

That depreciation in a broad sense includes repairs is also evidenced by the fact that it is the purpose of depreciation to keep the cost of the property intact. For it is obvious that the integrity of the investment can not be maintained through depreciation allowances alone unless these allowances are also large enough to cover such losses as those which are made up by repairs. While it is suggested herein that depreciation and repairs should be kept apart, these suggestions do not mean that it is believed that these items cannot be properly dealt with if combined into one. On the contrary, such combinations might be practicable not only in the provisions that are made for these costs, but in the expenditures of these provisions.

Nevertheless, there are certain advantages in keeping depreciation and repairs apart that should not be overlooked. Such practice seems to be more natural and therefore more easily understood. It would seem to enable closer estimates of the respective costs of these items than can be had in any other way. It tends to facilitate the closest practicable adjustment between the depreciation that has taken place in the property and the reservations made to offset such depreciation. It also appears to be more advantageous from other points of view.

Should it be desirable to do so, it is also practicable to apply the reserve account principles to repairs without including them in depreciation. All that is necessary to do to that end is to treat repairs in about the same manner as that in which depreciation is treated when provided for in advance. It is doubtful, however, whether any such practice as this for repairs alone could with any advantage be generally adopted.

While much has been said about how the repairs may be determined and distinguished from depreciation, few thoroughgoing studies of these questions appear to have been made in which the operating, the engineering and the accounting features involved were given due consideration. These questions, however, are so important that they should be made the subject of special studies, not only by industries, but by individual plants.

The terms "repair" and "maintenance" have been used interchangeably, although in a generic sense they are not the same and a proper distinction might be made between them. The accounting classification of the Railroad Commission of Wisconsin defines maintenance as follows: "Maintenance should be understood to mean 'upkeep', and should cover all expenditures for current or ordinary repairs, renewals and replacements of property resulting from wear and tear, or through those casualties which are incidental to the nature of the operation and which expenditures are necessary in order to keep up the productive capacity of the plant to its original or equivalent state of efficiency." Gradually, however, renewals or replacements chargeable to maintenance shade over into renewals or replacements chargeable to depreciation. This is pointed out in the following citation, also derived from the Wisconsin commission's classification of accounts: "When, however, a complete replacement of any building or structure or unit of equipment is made necessary regardless of such current expenditures, the uncurrent or extraordinary repairs, renewals or replacements made necessary will be charged to the *Depreciation Reserve* accumulated for that purpose."

These definitions, it is realized, are open to criticism because they leave unanswered the questions as to just what items constitute "repairs", "replacements", "complete replacements", etc.

In the endeavor to arrive at a distinction between them that is general in its scope, efforts have been made to determine what common consent thus far seems to regard as depreciation on the one hand, and repairs or maintenance on the other, and what some of the controlling elements are in each case.

The verbs most frequently used in discussing this question are maintain, repair, renew, replace and their derivitive nouns. These terms are defined by Webster as follows:

> MAINTAIN—To hold or keep in any particular state or condition, especially in a state of efficiency or validity.
> REPAIR—To restore to a sound or good state after decay, injury, dilapidation or partial destruction.
> RENEW—To make new again; to restore to existence.
> REPLACE—To supply an equivalent for.

While all of these terms may be said to relate to efficiency, the terms renewal and replacement are broader than the terms maintenance and repair. The term renewal, for instance, would seem to represent the substitution of a new unit of the same kind as the old one. Replacement, on the other hand, is a term that would seem to cover the substitution of a new unit for an old one when the new unit is equivalent though not of the same kind. Maintenance and repairs appear to cover the upkeep of minor units and of minor parts of the larger units of equipment, and these two terms are therefore used interchangeably.

From these definitions and from the nature and purpose of depreciation and of maintenance or repairs the inference may be drawn that the terms renewals and replacements represent the larger changes, such as the putting in of entire units of equipment in place of old units which have had to be discarded either because of general decay, or because of inadequacy or obsolescence; and that maintenance or repairs cover mostly such minor changes and repairs on the larger units as are necessary in order to keep up their efficiency during their normal service life, or until they must be discarded for such reasons as those just given. The cost of renewals and replacements as thus explained are proper charges to depreciation. The cost of maintenance or repairs as thus outlined are proper charges to repairs.

A few facts which further illustrate the difference between depreciation and repairs may also be given. Thus, the upkeep of bearings on machines, wheels on cars, tires on wagons, shoes on horses, commutators on dynamos are probably classed as maintenance or repairs, while the putting in of a new machine, a new car, a new horse, and a new dynamo for the old one is properly classed as renewal or replacement, or as depreciation. Repairs, therefore, consist of renewing minor equipment and minor parts of the larger units of equipment. Depreciation covers the renewal or replacement of the larger units themselves. The object of repairs in most cases is to maintain the efficiency of apparatus without replacing the apparatus itself. The wearing out and destruction of minor units or of minor parts of the larger unit goes on with much regularity and the cost of such wear and destruction can for this reason be charged directly to the operating expenses without causing undue fluctuations therein. In other words, since the outlays for repairs are fairly constant, they need not be provided for in advance through the building up of reserves for this purpose.

If the normal life of the different units of property is assumed to be the life which obtains when the units are kept up by ordinary repairs, then it also follows that such normal life is not after all greatly affected by repairs, but that it may be indefinitely prolonged by renewals. When the situation is viewed in this light many differences between repairs and depreciation may be discerned. In fact, they then lead to the inference that repairs should include all charges necessary in order to maintain the efficiency of the property or units up to the time when it has to be renewed either because of general decay or because of inadequacy and obsolescence.

For the purpose of further illustrating the theories upon which the above distinctions between repairs and depreciation are based they have been applied to a concrete case. A manufacturer, in order to produce a necessity, has just completed the construction of his plant. He has paid $10,000 for the land required and he has placed that amount into his capital account as an amount upon which he is entitled to earn interest and profit. The construction of the plant required in addition an expenditure of $80,000 for labor and materials. This amount, too, has been added to the capital account, making his investment $90,000. Of this total investment thus far, the plant alone representing an expenditure of $80,000 is subject to a lessening in value. The plant will depreciate due to wear and tear, it will depreciate with age, it will become inadequate and it will become obsolete. In order to operate efficiently he requires in addition $5,000 for working capital and $5,000 for materials and supplies. The working capital and materials and supplies are continuously being used up in the production and sale of the commodities but the manufacturer finds that he must keep that much working capital and materials and supplies continuously on hand in order to be able to meet all emergencies. Consequently he has added $10,000 to his capital account, thus making his total investment $100,000. He hires the necessary labor and begins operations. At the end of his first year of operations his gross sales amounted to $80,000. His expenses for wages and raw materials and supplies used up in production amount to $55,000, leaving $25,000 with which to reward the services of his fixed capital investment. He finds that during the year, although he did not renew his plant in any important detail, an expenditure of $4,500 was necessary for ordinary repairs to offset the wear and tear of the plant and keep it up to its original running efficiency. He finds further that if he had invested an equal amount of money in a similar enterprise he would have derived as interest and profit upon such investment $12,000. In his calculations he therefore regards this amount as his cost of capital. He finds further that during the year he has expended $500 for the renewal of equipment originally included in his investment of $80,000 for plant. This is an expenditure he had not anticipated. It makes him think that perhaps his major equipment, although at present in good running order, will have to be completely renewed. He begins to investigate and finds that he will have to renew all of his major equipment at the end of ten years. In the course of his investigations he finds too that the $500 expended for renewals will recur again the next year. The net result of these findings is that for the ten years during which the plant costing $80,000 is operating, there will be required a regular annual expenditure of $500 and in addition expenditures amounting to $79,500 at the end of ten years or an average of $8,000 annually.

This situation will serve to illustrate the economic significance of the separation between depreciation and repairs. The amount of $4,500 required in making minor renewals of major units of equipment, which themselves will not be retired until later on, is a pure operating cost and must be charged as an operating expense continuously. It is an expense incurred to preserve the usefulness of this equipment. It may be regarded somewhat in the nature of an insurance charge against inefficiency which must be met as it accrues. The amount of $500 representing the renewals of equipment the life of which is short is not a repair but a depreciation charge which, with the rest of the depreciation charges, must be met each year to keep intact the investment.

The illustration, it seems, should indicate where the distinction between repairs and depreciation lies. A depreciation charge is always accompanied by a hypothetical or actual retirement of the capital assets. Since it is necessary to properly account for all current and capital costs accruing within a financial period, such period being usually a year, repairs, on account of their regular occurrence, are charged to the year during which they are made, while depreciation is charged only insofar as it has actually or potentially occurred. Due to the fact, however, that potential depreciation requires separate financing, the actual depreciation, or that represented by minor yearly renewals, is combined with the charges for repairs.

Thus far I have tried to point out what the theoretical distinction is between repair charges on the one hand and depreciation charges on the other. To properly apply the distinction it will be necessary to define what constitutes a unit of equipment, the complete renewal or replacement of which is a charge to depreciation.

From a tangible or engineering standpoint, property may be classified as continuous or discontinuous. Continuous properties are such as from their very nature are never completely renewed at one time. Street railway tracks, the pole lines of electric or telephone utilities, and the distribution mains of gas or water utilities are examples of continuous properties. Discontinuous properties may be entirely or only partially renewed at one time. Machinery, rolling stock, and structures of all kinds are familiar examples or discontinuous properties.

I have already explained why the renewal of discontinuous properties lasting less than the customary accounting period is for convenience classed as a repair charge. In making complete or partial renewals of discontinuous properties lasting longer than the customary accounting period, judgment based on the distinctions previously drawn will have to be exercised. Because depreciation has been accruing against the life expectancy of the old unit with the view of creating a new life expectancy in new units, such a renewal cost may properly be charged to depreciation. The renewal of only a part of a discontinuous property would ordinarily be a charge to repairs unless the life expectancy of that part of the property has been increased and will not have to be renewed again when the life expectancy of the remaining part of the same property has expired.

In making renewals or replacements of continuous properties, it is difficult to say what shall constitute a unit. The best policy would seem to be to consider as a unit the substitution of any section of such structures, regardless of length and regardless of the cost. If this is not done, there are only two courses open. One is to fix an arbitrary limit which is undesirable because unscientific, and the other is to charge all renewals and replacements to repairs unless the entire continuous property is affected. Since the entire continuous structure is never renewed or replaced at any one time, the repair accounts would carry all these replacements with the final result that the depreciation allowance has failed to serve its purpose altogether.

The illustrations given above indicate in a general way the distinctions which obtain between depreciation and repairs. A depreciation charge is, as a rule, offset by a hypothetical or actual retirement of some unit of property or equipment and is supposed to be set aside at about the same rate as it has been estimated that the depreciation it covers will accrue. Repairs, on the other hand, being of more regular occurrence, are charged directly to repairs or maintenance as made or as found necessary. Depreciation reserves are accumulating against the life expectancy of existing units. Repair charges seem to consist of the current allowances that must be expended in order that this expected life of the units may be realized.

Losses or depreciation of property due to fire or accidents or to other causes than those given for depreciation and repairs must, as a rule, be covered either by insurance, special reserves, or direct charges against earning. Such losses are not supposed to be covered by the usual depreciation and repair allowances.

Property which is not continuous in the sense in which this term is used here may be said to consist of buildings, boilers, engines, generators, arc lights, rolling stock, etc. In illustrating what is depreciation and what are repair charges for a unit of this kind, an alternating current generator of about 200 kw. capacity, costing about $2,600, may be taken as an example.

The useful life of such a generator is usually about twenty years so that the depreciation on a straight line basis, disregarding its scrap value, is 5 per cent or $130 per year. The provision of $130 per annum is the annual expense of meeting the cost of the inevitable renewal or replacement of the unit when it shall be no longer suitable for operation. This allowance is not sufficient, however, to also keep the machine in working order during the period of its usefulness. It will be found that from time to time minor deficiencies develop in the generator which, when repaired, will restore the working efficiency of the machine. The cost of such attention is designated as "repair" and is charged directly to the operating accounts.

The original cost of the generator which we have taken as an example may be roughly divided into the following component parts:

Foundation	$200
Base	75
Frame	200
Core	200
Armature coils	1,000
Bearings	50
Bearing pedestals	75
Shaft	100
Rotor	
Spider or rotor frame	200
Fields or magnets	200
Collecting rings and brushes	25
Pulley	75
Total above	$2,400
Miscellaneous	200
	$2,600

It is ordinarily discovered upon examination of a piece of equipment that certain parts are subject to wear and tear while others are quite exempt from these causes. It is natural therefore that the elements or parts of equipment which are affected by wear and tear are also those upon which money must be expended for repairs while the remaining parts occasion little or no expense for upkeep during the entire life of the machine. Such is the case with the generator. The foundation, base, frame, core, pedestals and rotor frame are very rarely subject to any repairs except occasional painting to keep up the good appearance of the plant. Armature coils and field windings, however, are subject to electrical and mechanical strains and it is not unusual that whole coils or several coils must be renewed or reinsulated. Bearings also wear out, melt from friction and heat, and must be replaced; shafts become worn in the bearings and must be re-turned; collector rings become loosened or their insulation defective and must be repaired; pulleys become cracked or broken from strain and oil and must be replaced. There are also other miscellaneous repairs to insulated conductors, screws, bolts, cement work, etc. which cannot very well be listed separately. All these matters are an expense in the operation of the generator, but the renewal of the parts does not seem to change the identity of the whole nor prolong its normal life.

The repairs noted above for the generator in question, while not the same from year to year, may be estimated as follows for the entire period of its usefulness:

Armature coils	$200
Bearings (replaced several times)	200
Shaft (re-turning)	20
Field windings	50
Collector rings and brushes	10
Pulley	75
Total above	$555
Miscellaneous	145
	$700

The repairs, therefore, in this instance amount to about 27 per cent of the cost of the article or to $33 per year, which is very nearly 1.4 per cent of the value.

In the foregoing example, the line between "repair" and "depreciation" may be quite easily drawn because it is not difficult to see that the renewal of any of the parts of a generator does not prolong the useful life materially although its normal usefulness is sustained. When the generator is finally retired, it is not to be expected that the parts renewed will be more usable than the foundation, frame or core. The situation is somewhat different with other equipment which we sometimes consider to be a unit. An arc lamp with its supporting equipment, having a useful life of 12 years, may be mentioned as illustrative of this difference. The arc lamp complete and installed would cost about as follows:

1 lamp	$20.00
1 hanger board	3.25
100′ $^5/_{16}$″ galvanized wire	.91
1 sleet proof pole pulley	.40
1 sleet proof suspension pulley	.85
100′ ½″ manilla rope	1.24
100′ No. 6 weather proof copper wire	1.79
2—2 pin 3 ft. cross-arms	.24
2 oak pins	.02
2 glass insulators	.08
Labor	1.25
	$30.03

If the glass globe of the arc lamp has to be replaced, its regulating coils or feeding mechanism repaired, almost every one would agree no doubt that the cost should be classed as "repairs" and charged directly to operation. On the other hand, if the whole lamp were in such decrepit condition that the new one must be installed, then it is also clear that this would be a depreciation charge. The same rule appears to apply also to the hanger board, though with less force. When, however, consideration is given to the renewal of many of the other items comprising the arc lamp support, the border line between repair and depreciation is reached and doubt arises as to which way to proceed. We must then rest our conclusion upon whether the part renewed continues to perform service as an integral part of other equipment when the equipment of which it now forms a part is eventually discarded. Upon this basis, it appears that the renewal of the arc lamp and hanger board constitutes a depreciation charge; but repairs of lamp and hanger board parts, and renewal of galvanized supporting wire, pulleys, Manilla rope, copper leads to the lamp, cross-arms, pins and insulators constitute a repair charge. Such repairs during the life of the lamp may be estimated as follows:

Lamp repairs	$3.00
Hanger board repairs	.25
Pulleys	.75
Rope	1.50
Pins and insulators	.10
Total above	$5.60
Miscellaneous	.75
	$6.35

The repairs in this instance amount to 21 per cent of the original cost and are equal to 1¾ per cent per year, while depreciation alone amounts to over 8 per cent per year.

An analysis along the lines indicated in these illustrations is now being conducted by the Railroad Commission of Wisconsin. The results of this investigation, while necessarily imperfect and subject to amendment, will, it is hoped, lead to further study and observation of the problem by the operators themselves, so that at least a beginning will have been made in the endeavor to separate expenditures for repairs from expenditures for depreciation.

It will perhaps be said that the distinctions between depreciation and repairs, which have thus been outlined, are too general to shed much light upon the subject. It may be said further that the situation upon this point is not materially improved by the statement that depreciation is a capital cost while repairs is a current operating cost. In answer to this it may be pointed out that what properly constitutes repairs is a question that varies not only between different industries, but between different plants in the same industry, and that for this reason general rules can not always be laid down that fully cover the distinction in each specific case. All that can be done in this respect in a paper like this is to outline the theories upon which the distinction rests and to illustrate in a general way how these theories may be applied. The actual determination in each particular case of what items should be charged to depreciation is a matter that should largely be left to the manager, the engineer and the accountant.

Before leaving this subject I should like to speak a word of warning to those who would perhaps be inclined to accept the separation of maintenance expense into repairs and depreciation without further inquiry. The question is still an open one; and while the subject has here been treated as though a distinct line of demarcation may be found, further investigation, especially in connection with discontinuous properties, may reveal such difficulties that the attempt will have to be abandoned and repair and depreciation charges merged. When the accounts are merged there will be certain changes with respect to the handling and allowance of these expenditures and their entry upon the books. The annual allowance for maintenance will have to be increased so as to include both repair and depreciation allowances. Moreover, since the repair accounts now contain a miscellaneous lot of expenditures, the combination of these with depreciation will require a multiplication of accounts which shall be definitely related to the properties which are being maintained.

This brings us to the question of the bookkeeping machinery that is necessary to properly record on the account books of the plant all the transactions involved in providing for depreciation and in removing and renewing the discarded property. In this connection some understanding of the meaning and purpose of some of the leading accounts is of importance. Unfortunately the terminology of depreciation accounting does not seem to be fully standardized. Three accounts, however, are of special importance in connection with depreciation and these accounts are "Depreciation", "Depreciation Reserve" and "Depreciation Reserve Fund".

Depreciation: This is the operating expense account to which the annual estimated depreciation is charged. This account should show the charges for depreciation that enter into the cost of the service and that are intended as an offset to such depreciation as has taken place in the plant and equipment.

Depreciation Reserve: This account is credited with the amount set aside for depreciation and which, as stated, is charged to the depreciation account. It is also credited with the amounts received as interest for the use of balances held for depreciation. This account appears either on the right hand side of the balance sheet among the plant liabilities, or as a deduction from property and plant. If correctly kept, the balance in this account measures the lessening in value of the plant and equipment caused by the various forms of depreciation. The "Depreciation Reserve" account is thus designed to show the amount that has been reserved for earnings to cover depreciation. The balance in this account represents the difference between the total amount reserved and the charges made to this account for the renewals of property. The reserve account on the right hand side of the balance sheet is on the debit side of the balance sheet offset by the various forms of assets that have resulted from the reserves set aside for depreciation.

Depreciation Reserve Fund: This is an asset account and always appears on the left hand side of the balance sheet. It is charged with all the assets especially set aside for depreciation and transferred to the fund and debited when these assets are withdrawn for renewals. This reserve fund account may thus contain cash securities and other items of value that can be used for the replacement of worn out equipment or property. The assets included in the fund may thus equal all or only a part of the assets represented by the depreciation reserve, depending upon what proportion of the latter have been transferred to the fund. When these transfers cover all the assets reserved for depreciation then the balance in the depreciation reserve fund should agree with the amount of accrued depreciation not covered by renewals.

The accounting principles thus outlined, insofar as they relate to depreciation proper or when repairs are not included therein, have been further explained in APPENDIXES I and II, which are attached hereto. In APPENDIX I the different journal entries that are required in properly entering upon the books of the plant the various transactions involved in dealing with depreciation are more fully analyzed and illustrated. The purpose of this is to indicate in some detail what entries are required in this connection and how they should be made. This appendix is an essential part of this paper.

In APPENDIX II the principles that have been outlined are applied to actual transactions of a hypothetical plant for a period of five years. The transactions in this case cover not only the construction and extensions of the plant, but the provisions for depreciation and the renewal of the discarded property. The entries involved are explained and illustrated as well as posted to actual accounts. The accounts thus involved consist of a controlling account of the property of the plant and of four minor property accounts. In addition to this there are also such accounts as *Accounts Payable, Interest, Receipts from Operation, Balance Sheet, Depreciation Reserve, Capital Stock, Cash, Depreciation and Income Accounts.* While these accounts do not differ in principle from those ordinarily kept they have been named and treated more in line with what was deemed best for illustrative purposes than in accordance with prevailing classifications and practices. These facts should be borne in mind by those who may happen to examine them.

These accounts have also been kept upon the cost basis. That is, the property accounts have been charged with the original cost of the property and of the extensions to the same as well as with the cost of the renewed property, and credited with the original cost of the property discarded or taken out. Under this method the balance of the property accounts at any given time should show or agree with the actual cost of the property then in use. Whether this cost is greater or less than the cost of the original property would therefore depend upon whether the cost of the property renewed was greater or less than the cost of the original property. Prices or costs are almost constantly changing and this is also true of the equipment and of the methods of operation.

In cases where all or part of the property has been renewed it is therefore likely that the cost of the property in use will differ from the cost of the original property. The original cost of the plant and the cost of its property now in use are important elements in all appraisals of such plants and it is therefore of the greatest importance that the accounts should be so kept that these costs are fully disclosed. It is partly in order to emphasize this fact and to show that it is possible to so keep the accounts that the elements in question are disclosed, that the following tables which show not only the cost of the original property but of the property in use at the end of the period are included.

Referring to the table in this series which is headed *Property Summaries,* it appears that the original cost of the properties first installed and of the properties installed as additions was $157,500. In renewing these properties it was found that savings amounting to $4,000 were effected because the cost of units of equal capacity had meanwhile decreased. The actual cost of the units now in place and rendering service is, therefore, less than the original cost by the amount of this saving, or $153,500.

TABLES ILLUSTRATING DIFFERENCES BETWEEN ORIGINAL COST AND ACTUAL COST.

ORIGINAL INVESTMENT

Group A	$5,250
Group B	15,750
Group C	31,500
Group D	52,500
	$105,000

	First Year			*Second Year*		
	Additions	Retirements	Renewals	Additions	Retirements	Renewals
Group A	....	....	....	....	$5,250	$5,250
Group B	....	....	....	....	....	....
Group C	$5,250	....	....	$5,250	....	....
Group D	5,250	....	....	5,250	....	....
Total	$10,500	....	....	$10,500	$5,250	$5,250

	Third Year			*Fourth Year*		
	Additions	Retirements	Renewals	Additions	Retirements	Renewals
Group A	$5,250	....	....	....	$5,250	$5,250
Group B	5,250	$15,750	$18,750	$5,250	....	....
Group C	....	....	....	5,250	31,500	29,500
Group D	....	....	....	....	....	....
Total	$10,500	$15,750	$18,750	$10,500	$36,750	$34,750

	Fifth Year.			*Total Five Years.*		
	Additions	Retirements.	Renewals	Additions	Retirements	Renewals
Group A	....	$5,250	$5,250	$5,250	$15,750	$15,750
Group B	$5,250	....	....	15,750	15,750	18,750
Group C	....	5,250	5,250	15,750	36,750	34,750
Group D	5,250	52,500	47,500	15,750	52,500	47,500
Total	$10,500	$63,000	$58,000	$52,500	$120,750	$116,750

PROPERTY SUMMARIES

	Original cost	Net retirements	Actual costs
Group A	$10,500		$10,500
Group B	31,500	$3,000*	34,500
Group C	47,250	2,000	45,250
Group D	68,250	5,000	63,250
Total	$157,500	$4,000	$153,500

* Net additions.

APPENDIX I.

The bookkeeping entries that are required in accounting for depreciation are comparatively simple. The methods of determining the annual charges to operating expenses, both under the straight line and sinking fund methods, have been outlined above, and this amount, divided by twelve, will give the monthly charge. The monthly or other periodical charge having been determined, a journal entry is made each month, or for each other period as the case may be, charging *"Depreciation"* and crediting *"Depreciation reserve"* with the amount of the allowance. (Illustration I.)

CREATION OF DEPRECIATION RESERVE.
Depreciation .... Dr. ....
To Depreciation Reserve .... Cr. ....
(Being the proportion charged monthly to operating expenses for depreciation and credited to *Depreciation Reserve.)*

This entry is identical in working for both the straight line and sinking fund methods. The only point of difference is that the amounts under the straight line method would be larger.

From the JOURNAL the items are to be posted to the proper accounts in the "GENERAL LEDGER". When the financial statements for the month or period are made *"Depreciation"* is thus included in the INCOME ACCOUNT as one of the classes of operating expenses to be deducted from revenues before net earnings are determined. The *Depreciation Reserve* balance is either included in the BALANCE SHEET among the liabilities of the plant or may be shown as a deduction from *Property and Plant*. The practice of carrying the *Depreciation Reserve* among the liabilities of the utility is the one favored by the Railroad Commission of Wisconsin.

The fact that the *"Depreciation Reserve"* account is credited when the *"Depreciation"* account is debited indicates the manner in which earnings are reserved for the lessening of the plant value or for depreciation. The total credits to the reserve indicate the amount that has been withheld from revenues to meet the element of depreciation.

Under the sinking fund method one entry is required monthly or periodically in addition to the one discussed above. This entry is a debit to "Interest" and a credit to depreciation reserve. (Illustration II).

INTEREST COMPUTATION.

Interest (Depreciation Reserve Requirement)........ Dr. ....
To Depreciation Reserve........................ Cr. ....
(Being the proportion deducted monthly from gross income for interest under the sinking fund method, and credited to *Deprepreciation Reserve* because money was borrowed by the plant from this reserve for extensions.)

The foregoing constitute the required entries on the books of the utility in providing for depreciation under both the straight line and the sinking fund methods. These entries are simple and direct and utilities should encounter little difficulty in applying them in actual operation.

The next group of entries relates to the renewal or the replacement of the depreciated property. The importance of providing for depreciation becomes fully apparent when the equipment becomes useless for operating purposes. In fact, the full significance of a *Depreciation Reserve* is not realized until it becomes necessary to remove and replace the various units of the equipment. Before the new units can be installed the old units must be removed. When the renewals are made, therefore, the depreciation reserve should be charged and the proper plant account credited with the cost of the unit removed. The same entries will apply when equipment is removed but not replaced, or when equipment is permanently abandoned as occasionally happens with gas and water mains. (Illustration III.)

PROPERTY REMOVALS CHARGED TO DEPRECIATION RESERVE.

Depreciation Reserve	Dr.	
To Property and Plant	Cr.	
(Being the reduction of the appropriate property and plant account by the amount of the original cost of the equipment removed.)		

The entry is illustrative for the removal of any class of equipment, buildings or fixtures.

When equipment is renewed the cost of removing the old units should also be charged to "*Depreciation Reserve*" and credited directly to "*Accounts Payable*" and ultimately to "*Cash*". These entries need not be made through the JOURNAL, but should be treated in the same manner as the other expense vouchers of the utility. The costs of removing the equipment should also be met from the amounts reserved for depreciation. These reservations therefore should be great enough to cover not only the cost of the renewals proper, but the cost of removing the discarded property as well.

Providing all costs were journalized the entries for the costs of removing the property and equipment would be as follows: (Illustration IV.)

REMOVAL CHARGES.

(1) Depreciation Reserve	Dr.	
To Accounts Payable	Cr.	
(2) Accounts Payable	Dr.	
To Cash	Cr.	

Advanced accounting methods require that all costs pass through *Accounts Payable* before affecting *Cash*. This is necessary in order to record expenses, etc., on the accrual rather than on the disbursement basis. In regular practice the above entries would not be made through the JOURNAL, but the amounts would be carried directly to the *Depreciation Reserve, Accounts Payable* and *Cash* accounts from the records of original entry. This is for the purpose of eliminating much detail work. The accounting principles are the same as above, however, and the result would be exactly the same. The above method is used for simplicity of illustration.

The entire cost of the new units in replacement work is debited to *Plant* under the appropriate account in the same manner as plant extensions are charged under ordinary conditions. The credit in this case will be first of all to *Accounts Payable* and ultimately to *Cash*. (Illustration V.)

REPLACEMENT CHARGES.
(1) Property and Plant........................... Dr. ....
To Accounts Payable........................ Cr. ....
(2) Accounts Payable .... Dr. ....
To Cash .... Cr. ....

These entries are journalized for simplicity of illustration. In regular practice the entries would be made to the accounts affected directly from the records of original entry as the voucher, etc. This is for the purpose of eliminating much detail work. The necessity of passing all costs through *Accounts Payable* affecting *Cash* is that expense etc. may be recorded on the accrual rather than on the disbursement basis.

The cost of the new unit, equal in value to the one removed, being covered by the reservation of past earnings for depreciation, should be paid for from the earnings so reserved. If the cost of the new unit exceeds the cost of the one replaced, then such excess costs must be provided for in the same manner as other plant extensions are ordinarily provided for. This must necessarily be the case since the allowance for depreciation does not exceed the cost of the unit taken out.

When the equipment removed or taken out has value as scrap another entry is required on the books. In the determination of the amount to be reserved annually for depreciation it is customary to estimate the life of the equipment as well as its scrap value when taken out of service. Such scrap value reduces by its amount the sum that must be provided for depreciation. For the renewal of units (see Tables I and II) having a scrap value therefore the amount that should be charged to the *Depreciation Reserve* is the cost new of such unit less its scrap value. This result is obtained by charging the entire original cost of the unit to the *Depreciation Reserve Account* and then in a separate entry credit the *Depreciation Reserve Account* for the value of the scrap.

The old equipment may be disposed of in various ways. In some instances it is sold as soon as the unit is knocked down. In other cases again it is taken into the store room either to be used again in the business or to be held until sold. In either case there should be a credit for its value to the *Depreciation Reserve* and a debit to *Cash* if the junk is sold for cash, or to ***Materials and Supplies*** if placed in stock. (Illustration VI.)

Entries for Scrap Value.

1. When the junk is disposed of for cash the following entry is illustrative:

Cash .... Dr. ....
To Depreciation Reserve.................... Cr. ....

2. When the junk is placed in stock the entry would be as follows:

Materials and Supplies........................... Dr. ....
To Depreciation Reserve...................... Cr. ....

It may be advisable to enter the above transactions on the JOURNAL, but this is not necessary. Entry 1 can be made directly in the CASH BOOK without passing through the JOURNAL. Entry 2 can be entered on a voucher and posted directly from that source without passing through the JOURNAL. The above entries, however, are illustrative of the principle.

The entries thus far described illustrate conditions where a *Depreciation Reserve* only is maintained without a *Depreciation Reserve Fund.*

In creating such a reserve fund as an offset to the depreciation reserve, a check should be drawn from the amount involved and debited to the depreciation reserve fund and credited to cash. (Illustration VII).

Creation of a Depreciation Reserve Fund Account.

Depreciation Reserve Fund......................... Dr. ....
To Cash .... Cr. ....
(Being the proportion transferred to the fund account to secure a reserve of a like amount.)

The presence or use of such fund account would also cause a few changes in the entries that are required in connection with the removal of old property and the renewal of the same as well as with the scrap value. These changes mainly consist of substituting the *Reserve Fund Account* for the *Cash Account* in a few instances as indicated in previous illustrations. The necessity for these changes arises from the fact that cash affected was transferred from the *Cash Account* to the *Reserve Fund Account.*

APPENDIX II.

In order to more definitely explain how the accounts may be made to show the progress of theoretical depreciation, the renewals made to offset the same, and the maintenance and growth of the plant account, we have assumed a plant ready to begin operations, having a cost new of depreciable property of $105,000. The depreciation we will assume is to be financed on a 4 per cent sinking fund basis. In this illustration we will of course assume ideal conditions so that the renewal periods will coincide exactly with the previously estimated length of life. In order to congest the illustration we will assume property having a relatively short life.

In order to furnish the capital required to obtain the plant we will assume that stock is sold for cash. All bills rendered for construction purposes will first be made to pass through *Accounts Payable* before being paid out of the *Cash* account. The opening entries, neglecting the *Stock Subscription Account,* would be as follows:

Account.	Dr.	Cr.
Cash	$105,000	
Capital Stock		$105,000

Assuming that a controlling account is kept called *Plant Investment* and that the minor property accounts closing into the controlling account are denominated by their respective age groupings, as shown below, we may make the following entries in the JOURNAL.

Account.	Dr.	Cr.
Plant Investment	$105,000	
Group A	$5,250	
Group B	15,750	
Group C	31,500	
Group D	52,500	
Accounts Payable		$105,000
Accounts Payable	$105,000	
Cash		$105,000

In order that sufficient cash may be on hand to make renewals, we will carry an account called *Receipts from Operation.* To this account, because the plant is assumed to be normally successful, will be credited amounts sufficient to cover the annual allowance for accrued depreciation. When depreciation reserves are invested in plant extensions, as we will assume, the operations of the plant become responsible for interest which these amounts would have earned when invested outside the business. These earnings, too, will be shown in this account.

The amount required to cover the annual accrued depreciation is shown in the following table:

TABLE I.—SINKING FUND METHOD—4%.

Age group.	Life in years.	Cost new.	Scrap value.	Cost new less scrap.	Annual fund.
A....................	2	$5,250	$250	$5,000	$2,451
B....................	3	15,750	750	15,000	4,805
C....................	4	31,500	1,500	30,000	7,065
D....................	5	52,500	2,500	50,000	9,230
	....	$105,000	$5,000	$100,000	$23,551

During the first year of operation the accruing depreciation amounts to $23,551. Since it is not essential to the plan of depreciation that a fund be kept the entries for depreciation will concern themselves only with the *Depreciation Reserve Account.* Interest will accumulate upon the investment of these amounts in plant extensions and will be shown as *Receipts from Operation* in the appropriate account.

Journalized Transactions.

1st Year.

Accounts.	Dr.	Cr.
Depreciation	$23,551	
Depreciation Reserve .... (Annual Depreciation Allowance)		$23,551
Cash	$23,551	
Receipts from Operation.................		$23,551

It will be assumed further that the plant grows at a rate necessitating an investment of $10,500 per annum. These properties are all of a depreciable nature and belong 50% in Group C and 50% in Group D.—Scrap value $500.

The entries to be made in the JOURNAL in accordance with these assumptions are the following:

	Dr.	Cr.
Plant Investment	$10,500	
Group C	$5,250	
Group D	5,250	
Accounts Payable		$10,500
Accounts Payable	$10,500	
Cash		$10,500

2ND YEAR.

In order to estimate the accrued depreciation for the second year and the allowance to be made to cover the same, Table II has been constructed:

TABLE II. SINKING FUND METHOD.—4%.

Age group.	Life in years.	Cost new.	Scrap value.	Cost new less scrap.	Annual fund.
A....................	2	$5,250	$250	$5,000	$2,451
B....................	3	15,750	750	15,000	4,805
C....................	4	36,750	1,750	35,000	8,243
D....................	5	57,750	2,750	55,000	10,153
	....	$115,500	$5,500	$110,000	$25,652

This table shows that $25,652 must be set aside from the revenues of the second year to meet the accruing depreciation. In addition there has accumulated during the second year interest at 4% upon the amount set aside for depreciation at the close of the first year. These transactions should be evidenced by the proper entries in the JOURNAL, as follows:

Journalized Transactions.

2nd Year.

Accounts.	Dr.	Cr.
Depreciation	$25,652	
Depreciation Reserve		$25,652
(Annual Depreciation Allowance)		
Interest (Deprec. Reserve Requirement)......	$942	
Depreciation Reserve		942

As already explained, interest accretions to the depreciation reserve must, under the assumptions, be derived out of plant earnings. The same is true of the charge for depreciation for the current year. The following entry therfore becomes necessary:

	Dr.	Cr.
Cash	$26,594	
Receipts from operation		$26,594

According to Table I property comprised in Group A will have to be renewed at the end of the second year. This will necessitate an expenditure of $5,250, part of which or $5,000 to be derived from the amounts set aside in the *Depreciation Reserve* and part to be derived from the sale of the retired units as scrap. We are assuming, of course, that all our estimates have been correctly made. Before the new units can be installed the old units must be removed. When the renewals are made therefore the *Depreciation Reserve* must be charged and the proper plant accounts credited with the cost of the unit removed. This is accomplished by the following JOURNAL entry:

	Dr.	Cr.
Depreciation Reserve	$5,250	
Group A		$5,250
Plant Investment		5,250

When equipment is renewed the cost of removing the old units should also be charged to *Depreciation Reserve* and credited directly to *Accounts Payable* and ultimately to *Cash*. The costs of removing old equipment should also be met from the amounts reserved for depreciation so that these reservations ought to be great enough to cover not only the cost of the renewals proper, but the cost of removing the discarded property as well. In order to simplify our illustrations and make them more brief, we have purposely omitted this feature.

After the property has been removed, it has a junk value of $250. We will assume that it is sold for that amount immediately upon its removal. Since we have charged the *Depreciation Reserve Account* with the entire original cost of the old units, whereas we have only credited that account with the cost new less scrap value, we must now credit that account with the scrap value. This is accomplished by the following entry:

	Dr.	Cr.
Cash	$250	
Depreciation Reserve		$250

We are now ready to make the replacements of property in Group A. We will assume that the prices and cost of installing the property have remained exactly as they were when Group A properties were installed for the first time. The replacements having been made, we must record the same by means of the following entries:

	Dr.	Cr.
1. Plant Investment	$5,250	
Group A	$5,250	
Accounts Payable		$5,250
2. Accounts Payable	5,250	
Cash		5,250

In accordance with our assumption as to the annual growth of the plant we must record an investment of $10,500, 50% of which is property in Group C and 50% in Group D, Scrap value $500. This requires the following entries:

	Dr.	Cr.
Plant Investment	$10,500	
Group C	$5,250	
Group D	5,250	
Accounts Payable		$10,500
Accounts Payable	$10,500	
Cash		$10,500

3RD YEAR.

In order to estimate the accrued depreciation for the third year and the allowance to be made to cover the same Table III has been constructed:

TABLE III—SINKING FUND METHOD—4%.

Age group.	Life in years.	Cost new.	Scrap value.	Cost new less scrap.	Annual fund.
A....................	2	$5,250	$250	$5,000	$2,452
B....................	3	15,750	750	15,000	4,805
C....................	4	42,000	2,000	40,000	9,420
D....................	5	63,000	3,000	60,000	11,075
Total...........	....	$126,000	$6,000	$120,000	$27,752

The above table has been derived from the similar table constructed the previous year and from the various property accounts. While the property in Group A has been retired, it has been immediately renewed without change in investment cost. Properties in Groups C and D have been increased by the additional investments made during the second year of operation. The amount to be set aside for depreciation is shown to be $27,752. In addition there has accumulated during the third year interest at 4% upon the balance in the depreciation reserve at the close of the 2nd year. These transactions should be evidenced by the proper entries in the Journal, as follows:

	Dr.	Cr.
Depreciation	$27,752	
Depreciation Reserve (Annual Deprec. Allowance)		$27,752
Interest (Deprec. Reserve Required)	$1,806	
Depreciation Reserve		$1,806
Cash	$29,558	
Receipts from Operation		$29,558

According to Table I property comprised in Group B will have to be renewed at the end of the third year. This will necessitate an expenditure of $15,750, part of which, or $15,000, to be derived from the amounts set aside in the depreciation reserve and part to be derived from the sale of the retired units as scrap. It frequently happens, however, that installing new units of equal capacity requires the expenditure of more money than has been provided because the price of the same has advanced or it may be found desirable to install units of greater capacity than the ones retired, again necessitating the expenditure of more money than has been reserved. We will assume that the plant is confronted with the former situation. We will assume that units of equal efficiency would now cost $18,750, an advance of $3,000. Before the new units can be installed the old units must again be removed and provision made to transfer the funds from the reserve account. This is accomplished by the following Journal entry:

	Dr.	Cr.
Depreciation Reserve	$15,750	
Group B		$15,750
Plant Investment		$15,750

The reason why both of the accounts, *Group B* and *Plant Investment* are credited for the same amount, is that the *Plant Investment* account is a controlling account and any entry credited to one of the subsidiary property accounts must also be credited to the controlling property account where all the subsidiary property accounts are summarized.

In order to realize the full value of the retired unit for replacement purposes it must be sold as junk. The entry would be:

	Dr.	Cr.
Cash	$750	
Depreciation Reserve		$750

We are now ready to make the replacement of the property included under Group B. But the amount reserved for depreciation plus the scrap value is insufficient by $3,000 to pay for the new units. Hence an additional investment of $3,000 will be required. This is derived through *Accounts Payable* but must ultimately come out of *Cash*. The required entries are:

	Dr.	Cr.
1. Plant Investment	$18,750	
Group B	$18,750	
Accounts Payable		$18,750
2. Accounts Payable	$18,750	
Cash		$18,750

In accordance with our assumptions as to the annual growth of the plant we must again record an investment of $10,500, 50% of which is property in Group A and 50% in Group B, scrap value $500. This requires entries as follows:

	Dr.	Cr.
Plant Investment	$10,500	
Group A	$5,250	
Group B	5,250	
Accounts Payable		$10,500
Accounts Payable	$10,500	
Cash		$10,500

4TH YEAR.

In order to estimate the accrued depreciation for the fourth year and the allowance to be made to cover the same, Table IV has been constructed:

TABLE IV.—SINKING FUND METHOD—4%.

Age group.	Life in years.	Cost new.	Scrap value.	Cost new less scrap.	Annual fund.
A	2	$10,500	$500	$10,000	$4,902
B	3	24,000	1,000	23,000	7,367
C	4	42.000	2,000	40.000	9.420
D	5	63,000	3,000	60,000	11,076
	....	$139,500	$6,500	$133.000	$32,765

The above table has been derived from the similar table constructed the previous year and from the various property accounts. While the property in Group B has been retired, it has been immediately renewed with an increase in the investment cost of $3,000. Property in Groups A and B has been increased by the additional investments made during the third year of operation. This is shown by the property accounts. The amount to be set aside for depreciation is shown to be $32,765. In addition there has accumulated during the fourth year interest at 4% upon the balance in the depreciation reserve at the close of the third year. These transactions should be evidenced by the proper entries in the JOURNAL as follows:

	Dr.	Cr.
Depreciation	$32,765	
Depreciation Reserve		$32,765
(Annual Deprec. Allowance)		
Interest (Deprec. Reserve Required)..........	$2,388	
Depreciation Reserve		$2,388
Cash	$35,153	
Receipts from Operation..................		$35,153

According to Table IV and the property accounts, the properties comprised in Group A, renewed at the close of the 2nd year of operation, will again have to be renewed at the close of this year's operations. Property comprised in Group C having a life of four years will also have to be renewed at the same time. This will necessitate an expenditure in the first case of $5,250 and in the second case $31,500, part of these sums to be derived from the amounts set aside in the *Depreciation Reserve* and part to be derived from the sale of the retired units as scrap. In the case of the renewal of properties comprised in Group C it will be assumed that, as is sometimes the case, units of equal efficiency can be obtained at less than the original cost of the retired units. We will assume that this sum is $2,000 less than the first cost, thus making the sum required for renewals of Group C properties $29,500. Since the depreciation reserve has accumulated upon the basis of a cost of $31,500, there will be available $2,000, represented among the general assets, for repayment of capital investment.

Before the new units can be installed the old units must again be removed and provision made to transfer the funds from the reserve account. This is accomplished by the following JOURNAL entry:

	Dr.	Cr.
Depreciation Reserve	$36,750	
Group C		$31,500
Group A		5,250
Plant Investment		$36,750

In order to realize the full value of the retired units for replacement and capital repayment purposes, they must be sold as scrap. This entry would be as follows:

	Dr.	Cr.
Cash	$1,750	
Depreciation Reserve		$1,750

We are now ready to make the replacements of the property included under Groups A and C. The required entries are:

	Dr.	Cr.
1. Plant Investment	$34,750	
Group A	$5,250	
Group C	29,500	
Accounts Payable		$34,750
2. Accounts Payable	$34,750	
Cash		$34,750

In accordance with our assumptions as to the annual growth of the plant we must again record an investment of $10,500, 50% of which is property in Group B and 50% in Group C, scrap value $500. This requires entries as follows:

	Dr.	Cr.
Plant Investment	$10,500	
Group B	$5,250	
Group C	5,250	
Accounts Payable		$10,500
Accounts Payable	$10,500	
Cash		$10,500

These JOURNAL entries have been carried forward to the GENERAL LEDGER ACCOUNTS affected, summaries of which are shown at the close of this appendix.

5TH YEAR.

In order to estimate the accrued depreciation for the fifth year and the allowance to be made to cover the same, Table V has been constructed:

TABLE V. SINKING FUND METHOD—4%.

Age group	Life in years	Cost new	Scrap value	Cost new less scrap	Annual fund
A	2	$10,500	$500	$10,000	$4,902
B	3	29,250	1,250	28,000	8,968
C	4	45,250	2,250	43,000	10,127
D	5	63,000	3,000	60,000	11,076
	....	$148,000	$7,000	$141,000	$35,073

The above table has been derived from the similar table constructed the previous year and from the various property accounts. The amount to be set aside for depreciation is shown to be $35,073. In addition there has accumulated during the fifth year interest at 4% upon the balance in the *Depreciation Reserve* at the close of the fourth year. These transactions should be evidenced by the proper entries in the JOURNAL, as follows:

	Dr.	Cr.
Depreciation	$35,073	
Depreciation Reserve		$35,073
(Annual Deprec. Allowance)		
Interest (Deprec. Res. Requirement)	2,394	
Depreciation Reserve		2,394
Cash	37,467	
Receipts from Operation		37,467

According to Table V and the property accounts, some of the properties comprised in Group A will have to be renewed at the close of this year's operations. These properties are those which were added as additional investments during the third year of operation and were taken into the books at the close of that year. They represent an investment of $5,250 which we will assume can be renewed at the same cost price. Of the properties comprised in Group C those which were added as additional investments during the first year and taken into the books at the close of that year's operations will have to be renewed at the close of the fifth year. They represent an investment of $5,250 which we will assume can be renewed at the same cost price. Of the properties comprised in Group D those properties originally invested and amounting to $52,500 will have to be renewed at the close of this year's operations. We will assume that these properties can be renewed for less than their original cost, or $47,500. Since the depreciation reserve has accumulated upon the basis of original cost there will be available after renewals $5,000, represented among the general assets, for repayment of capital investment.

Before the new units can be installed, the old units must again be removed and provision made to transfer the funds from the *Reserve Account.* This is accomplished by the following JOURNAL entry:

	Dr.	Cr.
Depreciation Reserve	$63,000	
Group A		$5,250
Group C		5,250
Group D		52,500
Plant Investment		$63,000

Again, in order to realize the full value of the retired units for replacement and capital repayment purposes, they must be sold and their value as scrap obtained. The entry is as follows:

	Dr.	Cr.
Cash	$3,000	
Depreciation Reserve		$3,000

Ordinarily, the next step would be to make the necessary replacements. An examination of the *Cash Account* will show, however, that the funds are not available for making the replacements. There will be required for replacements $58,000, whereas the balance of the *Cash Account* shows only $57,323. The *Depreciation Reserve Account,* however indicates that funds to the amount of $100,323 have been set aside. The money should be on hand, however, because the accounts have been correctly kept. Obviously, if they are not in the *Cash Account,* they must be in plant. An analysis of our *Plant Investment Account* should disclose, therefore, where the money has gone.

During the first year we find that $10,500 have been taken out of the *Cash Account,* money properly belonging to the reserve for depreciation, and therefore borrowed from it, in order to pay for the year's extensions. The same is true for the second year. During the third year we find that not only have $10,500 been borrowed for extensions but $3,000 additional were required above the original cost set aside in the reserve to renew properties in Group B. During the fourth year $10,500 were borrowed for extensions; but for the renewal of properties in Groups

A and C, $2,000 less was required than had been set aside in the reserve. During the current year there will be required $10,500 for extensions but for the renewals of properties in Groups A, C, and D, $5,000 less will be required than has been accumulating in the reserve. It is very evident, therefore, that in order to keep the original investment intact, in order to return to the fund the amounts which have been borrowed, capital stock will have to be sold. If we had not used the reserve for plant extensions, the following amounts would have been required each year to finance them:

1st year	$10,500
2nd year	10,500
3rd year	13,500
4th year	8,500
5th year	5,500
Total requirements	$48,500

In arriving at the total shown in the above table it has been assumed, and the assumption is in accord with the usual practice, that amounts set aside in the *Depreciation Reserve,* but not required for the renewals to which they are specifically applicable, instead of being returned to the investors, are kept in the business and applied to necessary extensions. When, therefore, we increase the capital stock by the above figure, this, in effect, maintains the capital stock or proprietorship account on a par with the original cost value of the capital assets, or as in this case, the *Plant Investment Account.* This entry would be as follows:

	Dr.	Cr.
Cash	$48,500	
Capital Stock		$48,500

We are now ready to make replacements of the property included under Groups A, C and D. The required entries are:

	Dr.	Cr.
1. Plant Investment	$58,000	
Group A	$5,250	
Group C	5,250	
Group D	47,500	
Accounts Payable		$58,000
2. Accounts Payable	$58,000	
Cash		$58,000

In accordance with our assumptions as to the annual growth of the plant we must record an investment of $10,500, 50% of which is property in Group B and 50% in Group D, scrap value $500. The entries are:

	Dr.	Cr.
Plant Investment	$10,500	
Group B	$5,250	
Group D	5,250	
Accounts Payable		$10,500
Accounts Payable	$10,500	
Cash		$10,500

Dr.	*Plant Investment Account.*	Cr.
$105,000	Original Investment, Groups A, B, C and D, 1st yr.	
10,500	Additional Investment, Groups C and D	
	Balance	$115,500
$115,500		$115,500
$115,500	Balance Investment, 1st yr	
10,500	Additional Investment, Groups C and D, 2nd yr	
	Retired Investment, Group A, 2nd yr	$5,250
5,250	Renewed Investment, Group A, 2nd yr	
	Balance	126,000
$131,250		$131,250
$126,000	Balance Investment, All Groups, 2nd yr	
10,500	Additional Investment, Groups A and B, 3rd yr	
	Retired Investment, Group B, 3rd yr	$15,750
18,750	Renewed Investment, Group B, 3rd yr	
	Balance	139,500
$155,250		$155,250
$139,500	Balance Investment, All Groups, 3rd yr	
	Retired Investment, Groups C and A, 4th yr	$36,750
34,750	Renewed Investment, Groups C and A, 4th yr	
10,500	Additional Investment, Groups C and B, 4th yr	
	Balance	148,000
$184,750		$184,750
$148,000	Balance Investment, All Groups, 4th yr	
	Retired Investment, Groups A, C, D, 5th yr	$63,000
58,000	Renewed Investment, Groups A, C, D, 5th yr	
10,500	Additional Investment, Groups B and D, 5th yr	
	Balance	153,500
$216,500		$216,500
$153,500	Balance Investment, All Groups, 5th yr	

Group A. Property Account.

Dr.		Cr.
$5,250	Original Investment, 1st Year	
	Balance	$5,250
$5,250		$5,250
$5,250	Balance Investment, 1st Year	
	Retired Investment, 2nd Year	$5,250
5,250	Renewed Investment, 2nd Year	
	Balance	5,250
$10,500		$10,500
$5,250	Balance Investment, 2nd Year	
5,250	Additional Investment, 3rd Year	
	Balance	$10,500
$10,500		$10,500
$10,500	Balance Investment, 3rd Year	
	Retired Investment, 4th Year	$5,250
5,250	Renewed Investment, 4th Year	
	Balance	10,500
$15,750		$15,750
$10,500	Balance Investment, 4th Year	
	Retired Investment, 5th Year	$5,250
5,250	Renewed Investment, 5th Year	
	Balance	10,500
$15,750		$15,750
$10,500	Balance Investment, 5th Year	

Group B. Property Account.

Dr.		Cr.
$15,750	Original Investment, 1st yr	
	Balance	$15,750
$15,750		$15,750
$15,750	Balance Investment, 1st yr	
	Balance	$15,750
$15,750		$15,750
$15,750	Balance Investment, 2nd yr	
	Retired Investment, 3rd yr	$15,750
18,750	Renewed Investment, 3rd yr	
5,250	Additional Investment, 3rd yr	
	Balance	24,000
$39,750		$39,750
24,000	Balance Investment, 3rd yr	
5,250	Additional Investment, 4th yr	
	Balance	29,250
$29,250		$29,250

$29,250	Balance Investment, 4th yr	
5,250	Additional Investment, 5th yr	
	Balance	$34,500
$34,500	Balance	$34,500
$34,500	Balance Investment, 5th yr	

Dr.	*Group C. Property Account.*	Cr.
$31,500	Original Investment, 1st yr	
5,250	Additional Investment, 1st yr	
	Balance	$36,750
$36,750		$36,750
$36,750	Balance Investment, 1st yr	
5,250	Additional Investment, 2nd yr	
	Balance	$42,000
$42,000		$42,000
$42,000	Balance Investment, 2nd yr	
	Balance	42,000
$42,000		$42,000
$42,000	Balance Investment, 3rd yr	
	Retired Investment, 4th yr	$31,500
29,500	Renewed Investment, 4th yr	
5,250	Additional Investment, 4th yr	
	Balance	45,250
$76,750		$76,750
$45,250	Balance Investment, 4th yr	
	Retired Investment, 5th yr	$5,250
5,250	Renewed Investment, 5th yr	
	Balance	45,250
$50,500		$50,500
$45,250	Balance Investment, 5th yr	

Dr.	*Group D. Property Account.*	Cr.
$52,500	Original Investment, 1st yr	
5,250	Additional Investment, 1st yr	
	Balance	$57,750
$57,750		$57,750
$57,750	Balance Investment, 1st yr	
5,250	Additional Investment, 2nd yr	
	Balance	$63,000
$63,000		$63,000

$63,000	Balance Investment, 2nd yr	
	Balance	$63,000
$63,000		$63,000
$63,000	Balance Investment, 3rd yr	
	Balance	$63,000
$63,000		$63,000
$63,000	Balance Investment, 4th yr	
	Retired Investment, 5th yr	$52,500
47,500	Renewed Investment, 5th yr	
5,250	Additional Investment, 5th yr	
	Balance	63,250
$115,750		$115,750
$63,250	Balance Investment, 5th yr	

Dr.	*Accounts Payable.*	Cr.
$105,000	Construction—Groups A, B, C and D	$105,000
10,500	Additions—Groups C and D, 1st yr	10,500
$115,500		$115,500
$5,250	Renewal—Group A, 2nd yr	$5,250
10,500	Additions—Groups C and D, 2nd yr	10,500
$15,750		$15,750
$18,750	Renewal and Additions—Group B, 3rd yr	$18,750
10,500	Additions—Groups A and B	10,500
$29,250		$29,250
$34,750	Renewal—Groups A and C, 4th yr	$34,750
10,500	Additions—Groups B and C, 4th yr	10,500
$45,250		$45,250
$58,000	Renewal—Groups A, C and D, 5th yr	$58,000
10,500	Additions—Groups B and D	10,500
$68,500		$68,500

Dr.	*Capital Stock Account.*	Cr.
	Stock Sale—original	$105,000
$105,000	Balance	
$105,000		$105,000
	Balance, 1st yr	$105,000
$105,000	Balance	
$105,000		$105,000
	Balance, 2nd yr	$105,000

$105,000	Balance	
$105,000		$105,000
	Balance, 3rd yr	$105,000
$105,000	Balance	
$105,000		$105,000
	Balance, 4th yr	$105,000
	Stock Sale—Additional, 5th yr	48,500
$153,500	Balance	
$153,500		$153,500
	Balance, 5th yr	$153,500

Dr.	*Cash Account.*	Cr.
$105,000	Proceeds—Sale of Stock	$105,000
23,551	Earnings to cover depreciation, 1st yr	
	Additions—Groups C and D, 1st yr	10,500
	Balance	13,051
$128,551		$128,551
$13,051	Balance, 1st yr	
26,594	Earnings to cover depreciation and interest, 2nd yr.	
250	Scrap Value—Group A, 2nd yr	
	Renewal—Group A, 2nd yr	$5,250
	Additions—Groups C and D, 2nd yr	10,500
	Balance	24,145
$39,895		$39,895
$24,145	Balance, 2nd yr	
29,558	Earnings to cover depreciation and interest, 3rd yr.	
750	Scrap Value—Group B, 3rd yr	
	Renewal and Additions—Group B, 3rd yr	$18,750
	Additions—Groups A and B	10,500
	Balance	25,203
$54,453		$54,453
$25,203	Balance, 3rd yr	
35,153	Earnings to cover depreciation and interest, 4th yr.	
1,750	Scrap Value—Groups C and A, 4th yr	
	Renewals—Groups A and C	$34,750
	Additions—Groups B and C	10,500
	Balance	16,856
$62,106		$62,106
$16,856	Balance, 4th yr	
37,467	Earnings to cover depreciation and interest, 5th yr.	
3,000	Scrap Value—Groups A, C and D, 5th yr	
48,500	Proceeds—Sale of Stock	
	Renewals—Groups A, C and D—5th yr	$58,000
	Additions—Groups B and D	10,500
	Balance	37,323
$105,823		$105,823
$37,323	Balance, 5th yr	

Dr.	*Depreciation Reserve.*	Cr.
	Requirement, 1st yr	$23,551
$23,551	Balance	
$23,551		$23,551
	Balance, 1st yr	$23,551
	Requirement, 2nd yr	25,652
	Interest, 2nd yr	942
	Scrap Value—Group A	250
$5,250	Renewal—Group A	
45,145	Balance, 2nd yr	
$50,395		$50,395
	Balance, 2nd yr	$45,145
	Requirement, 3d yr	27,752
	Interest, 3d yr	1,806
	Scrap Value—Group B	750
$15,750	Renewal—Group B	
59,703	Balance, 3d yr	
$75,453		$75,453
	Balance, 3d yr	$59,703
	Requirement, 4th yr	32,765
	Interest, 4th yr	2,388
	Scrap Value, Groups A and C	1,750
$36,750	Renewal, Groups A and C	
59,856	Balance, 4th yr	
$96,606		$96,606
	Balance, 4th yr	$59,856
	Requirement, 5th yr	35,073
	Interest, 5th yr	2,394
	Scrap Value, Groups A, C and D	3,000
$63,000	Renewal, Groups A, C and D	
37,323	Balance, 5th yr	
$100,323		$100,323
	Balance, 5th yr	$37,323

Balance Sheet—end of 1st year.

	Dr.	Cr.
Resources:		
Plant Investment	$115,500	
Cash	13,051	
Liabilities:		
Capital Stock		$105,000
Depreciation Reserve		23,551
	$128,551	$128,551

Balance Sheet—end of 2nd year.

Resources:		
Plant Investment	$126,000	
Cash	24,145	
Liabilities:		
Capital Stock		$105,000
Depreciation Reserve		45,145
	$150,145	$150,145

Balance Sheet—end of 3d year.

Resources:		
Plant Investment	$139,500	
Cash	25,203	
Liabilities:		
Capital Stock		$105,000
Depreciation Reserve		59,703
	$164,703	$164,703

Balance Sheet—end of 4th year.

Resources:		
Plant Investment	$148,000	
Cash	16,856	
Liabilities:		
Capital Stock		$105,000
Depreciation		59,856
	$164,856	$164,856

Balance Sheet—end of 5th year.

Resources:			
Group A—Property	$10,500		
Group B—Property	34,500		
Group C—Property	45,250		
Group D—Property	63,250		
Plant Investment		$153,500	
Cash		37,323	
Liabilities:			
Capital Stock			$153,500
Depreciation Reserve			37,323
		$190,823	$190,823

Dr.	*Interest.*	Cr.
$942	Depreciation Reserve Requirement, 2nd year......	
	Balance to Income Account......................	$942
$942		$942
$1,806	Depreciation Reserve Requirement, 3rd year......	
	Balance to Income Account......................	$1,806
$1,806		$1,806
$2,388	Depreciation Reserve Requirement, 4th year......	
	Balance to Income Account......................	$2,388
$2,388		$2,388
$2,394	Depreciation Reserve Requirement, 5th year......	
	Balance to Income Account......................	$2,394
$2,394		$2,394

Dr.	*Receipts from Operation.*	Cr.
	Earnings to cover depreciation, 1st yr............	$23,551
$23,551	Balance to Income Account......................	
$23,551		$23,551
	Earnings to cover deprec. and int., 2nd yr........	$26,594
$26,594	Balance to Income Account......................	
$26,594		$26,594
	Earnings to cover deprec. and int., 3d yr..........	$29,558
$29,558	Balance to Income Account......................	
$29,558		$29,558
	Earnings to cover deprec. and int., 4th yr........	$35,153
$35,153	Balance to Income Account......................	
$35,153		$35,153
	Earnings to cover deprec. and int., 5th yr........	$37,467
$37,467	Balance to Income Account......................	
$37,467		$37,467

Dr.	*Depreciation Account.*	Cr.
$23,551	Deprec. Res. Requirement, 1st yr.................	
	Balance to Income Account.......................	$23,551
$23,551		$23,551
$25,652	Deprec. Res. Requirement, 2nd yr................	
	Balance to Income Account.......................	$25,652
$25,652		$25,652
$27,752	Deprec. Res. Requirement, 3rd yr................	
	Balance to Income Account.......................	$27,752
$27,752		$27,752
$32,765	Deprec. Res. Requirement, 4th yr................	
	Balance to Income Account.......................	$32,765
$32,765		$32,765
$35,073	Deprec. Res. Requirement, 5th yr................	
	Balance to Income Account.......................	$35,073
$35,073		$35,073

Dr.	*Income Account.*	Cr.
	Receipts from Operation, 1st yr..................	$23,551
$23,551	Depreciation, 1st yr............................	
$23,551		$23,551
	Receipts from Operation, 2nd yr..................	$26,594
$25,652	Depreciation, 2nd yr............................	
942	Interest, 2nd yr................................	
$26,594		$26,594
	Receipts from Operation, 3d yr...................	$29,558
$27,752	Depreciation, 3d yr.............................	
1,806	Interest, 3d yr.................................	
$29,558		$29,558
	Receipts from Operation, 4th yr..................	$35,153
$32,765	Depreciation, 4th yr............................	
2,388	Interest, 4th yr................................	
$35,153		$35,153
	Receipts from Operation, 5th yr..................	$37,467
$35,073	Depreciation	
2,394	Interest	
$37,467		$37,467

TABLE I.

STRAIGHT LINE METHOD.

Class.	Life.	Cost of reproduction, new.	Scrap value.	Cost new, less scrap.	Annual per cent of depreciation.	Annual amount required to cover depreciation.
A..........	5	$210	$0	$210	20.00	$42
B..........	8	7,124	14	7,110	12.50	889
C..........	10	17,361	153	17,208	10.00	1,721
D..........	12	26,272	0	26,272	8.33	2,188
E..........	15	143,470	11.920	131,550	6.67	8,774
F....... ..	16	65,632	33,374	32,258	6.25	2,016
G..........	20	113,336	9,232	104,097	5.00	5,205
H..........	25	43,747	7,631	36,116	4.00	1,445
I..........	50	14,337	0	14,337	2.00	287
J..........	60	1,165	0	1,165	1.67	19
K..........	75	21,920	0	21,920	1.33	292
		$454,574	$62,331	$392,243	....	$22,878
		12% overh'd	....	47,069	....	2,745
				$439,312		$25,623

$\frac{22,878}{392,243}$ equals 5.83 per cent.

This table shows the balance between the cost new and the scrap value to be $439,312, and the annual amount to be set aside for depreciation to be $25,623. This table also shows that the annual rate for depreciation varies from 20 per cent for the property on the five year group to 1.33 per cent for the property in the seventy-five year group. The average rate for all these groups is therefore 5.83 per cent on the depreciable amount.

TABLE II.

SINKING FUND METHOD.

Class.	Life.	Cost of reproduction new.	Scrap value.	Cost new less scrap.	Annual reserve on two per cent basis.	Annual charge to operating expenses required.
A..........	5	$210	$0	$210	19.71	$40
B..........	8	7,124	14	7,110	11.65	828
C..........	10	17,361	153	17,208	9.13	1,571
D..........	12	26 272	0	26,272	7.46	1,960
E..........	15	143,470	11.920	131,550	5.78	7,604
F..........	16	65,632	33,374	32,208	5.36	1,729
G..........	20	113,336	9,239	104,097	4.12	4,289
H..........	25	43,747	7,681	36,116	3.12	1,127
I..........	50	14,337	0	14,337	1.18	169
J..........	60	1,165	0	1,165	.88	10
K..........	75	21,920	0	21,920	.58	127
		$454,574	$62,331	$392,243	....	$19,454
		12% overhead.		47,069	....	2,334
				$439,312		$21,788

$\frac{19{,}454}{392{,}243}$ equals 4.959 per cent.

This table shows that on a 2 per cent sinking fund basis the amount that must be annually charged to operating expenses for depreciation is $21,788 or about 4.96 per cent of the property value.

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